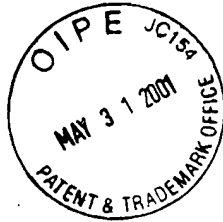




INVESTOR IN PEOPLE

The Patent Office
Concept House
Cardiff Road
Newport
South Wales
NP10 8QQ

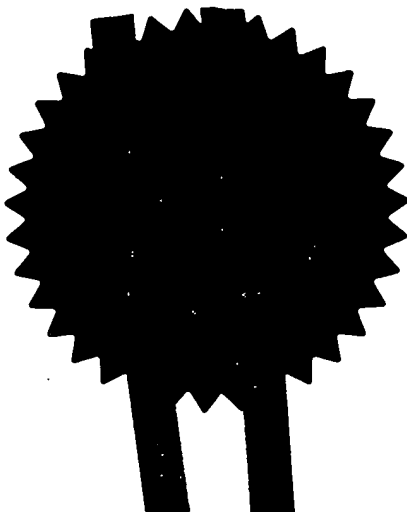


I, the undersigned, being an officer duly authorised in accordance with Section 74(1) and (4) of the Deregulation & Contracting Out Act 1994, to sign and issue certificates on behalf of the Comptroller-General, hereby certify that annexed hereto is a true copy of the documents as originally filed in connection with the patent application identified therein.

In accordance with the Patents (Companies Re-registration) Rules 1982, if a company named in this certificate and any accompanying documents has re-registered under the Companies Act 1980 with the same name as that with which it was registered immediately before re-registration save for the substitution as, or inclusion as, the last part of the name of the words "public limited company" or their equivalents in Welsh, references to the name of the company in this certificate and any accompanying documents shall be treated as references to the name with which it is so re-registered.

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Signed

Dated

14 FEB 2001

The Patent Office

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Request for grant of a patent

(See the notes on the back of this form. You can also get an explanatory leaflet from the Patent Office to help you fill in this form).

1. Your Reference

P.6161GBA

2. Patent application number

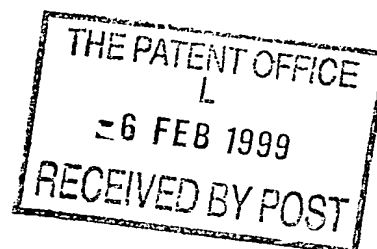
(The Patent Office will fill in this part)

06 FEB 1999

9902579.3

3. Full name, address and postcode of the or of each applicant (underline all surnames)

NEW TRANSDUCERS LIMITED
Stonehill
Huntingdon
Cambridgeshire
PE18 6ED
G.B.



Patents ADP number (if you know it)

If the applicant is a corporate body, give the country/state of its incorporation

G.B.

4. Title of the invention

DISPLAY SCREEN

5. Name of your agent (if you have one)

"Address for service" in the United Kingdom to which all correspondence should be sent (including the postcode)

MAGUIRE BOSS
5 Crown Street
St. Ives
Cambridgeshire
PE17 4EB

Patents ADP number (if you know it)

00009191002

6. If you are declaring priority from one or more earlier patent applications, give the country and the date of filing of the or of each of these earlier applications and (if you know it) the or each application number

Country

Priority application number
(if you know it)

Date of filing
(day/month/year)

7. If this application is divided or otherwise derived from an earlier UK application, give the number and the filing date of the earlier application

Number of earlier application

Date of filing
(day/month/year)

8. Is a statement of inventorship and of right to grant of a patent required in support of this request? (Answer 'Yes' if:

Yes

- a) any applicant named in part 3 is not an inventor, or
 - b) there is an inventor who is not named as an applicant, or
 - c) any named applicant is a corporate body:)
- See note (d)

Patents Form 1/77

9. Enter the number of sheets for any of the following items you are filing with this form.

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Continuation sheets of this form

Description 4

Claims(s)

Abstract

Drawing(s)

1 + 1



10. If you are also filing any of the following, state how many against each item.

Priority documents

Translations of priority documents

Statement of inventorship and right to grant of a patent (*Patents Form 7/77*)

Request for preliminary examination and search (*Patents Form 9/77*)

Request for substantive examination (*Patents Form 10/77*)

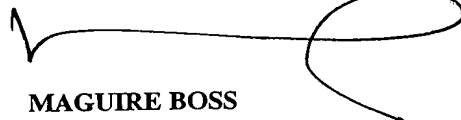
Any other documents
(please specify)

11.

I/We request the grant of a patent on the basis of this application.

Signature

Date 05/02/99


MAGUIRE BOSS

12. Name and daytime telephone number of person to contact in the United Kingdom

P.A. MAGUIRE

Tel: 01480 301588

Warning

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Notes

a) If you need help to fill in this form or you have any questions, please contact the Patent Office on 0645 500505.

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5

TITLE: DISPLAY SCREEN

10

DESCRIPTION

15 The invention relates to display screens e.g. for computer monitors, televisions, laptop and the like personal computers, personal organisers, hand-held and the like computers having a display screen and one or more loudspeakers.

20 It is known from WO97/09854 to suggest driving the display screen of a laptop computer as a resonant panel loudspeaker, e.g. of the kind described in WO97/09842.

 It is also known to suggest driving the transparent face of a wristwatch to act as a buzzer or sounder i.e. to
25 emit simple sound tones, e.g. to act as an alarm for the wearer of the wristwatch.

 It is among the objects of the invention to provide a display screen module comprising a transparent panel-form

member which can be driven as a loudspeaker, e.g. to reproduce speech or music and which may be incorporated as an assembly in the manufacture of VDU's and the like.

According to the invention a display screen module
5 e.g. for a visual display unit (VDU) comprises a display screen, a resonant panel-form member, at least a portion of which is transparent and through which the display screen is visible and means exciting the panel-form member to resonate to act as an acoustic radiator, the exciter
10 being disposed at an edge or margin of the panel-form member so as not to intrude into the said transparent portion.

The member may be rigid and may be of plastics, e.g. polystyrene, or may be of glass or other transparent
15 material.

More than one vibration exciter may be provided. The vibration exciters may be mounted in pairs to an edge or marginal portion of the panel-form member or other portion of the member outside its transparent portion. The drive
20 means may be coupled directly to the panel-form member.

The exciter(s) may be electrodynamic and may be inertial. Alternatively the exciter(s) may be piezo-electric.

The loudspeaker may be of the general kind described
25 in International patent application number WO 97/09842. Thus the loudspeaker may comprise a member capable of sustaining and propagating input vibrational energy by bending waves in at least one operative area extending

transversely of thickness to have resonant mode vibration components distributed over said at least one area and having a vibration exciter mounted on said member to vibrate the member to cause it to resonate forming an acoustic radiator which provides an acoustic output when resonating. Such loudspeakers are known as distributed mode (DM) loudspeakers.

The display screen may be panel-form and may be bonded to the transparent resonant panel-form member around respective marginal portions thereof, e.g. by means of an interposed resilient seal, e.g. of foamed rubber. The display screen may be a liquid crystal display or plasma display. The transparent resonant panel-form member may be mounted to the display screen to form a cavity enclosing a face of the panel-form member whereby acoustic radiation from the said enclosed face is contained within the enclosure, in the manner of an infinite baffle loudspeaker. A polymer-film liquid crystal display may be bonded or otherwise mounted on the panel-form member, whereby the loudspeaker and visual display functions are integrated.

The invention is diagrammatically illustrated, by way of example, in the accompanying drawings, in which:-

Figure 1 is a perspective view of a display screen module which integrates the functions of the display screen with that of a loudspeaker, and

Figures 2 and 3 are cross-sectional views through alternative embodiments of module of Figure 1, with that

of Figure 2 being excited by an electrodynamic exciter and that of Figure 3 being excited by a piezo exciter.

Fig 2

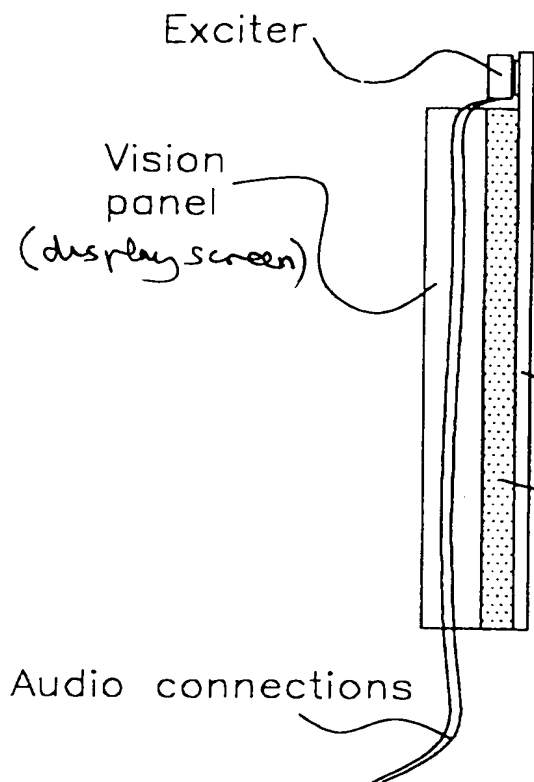


Fig 3

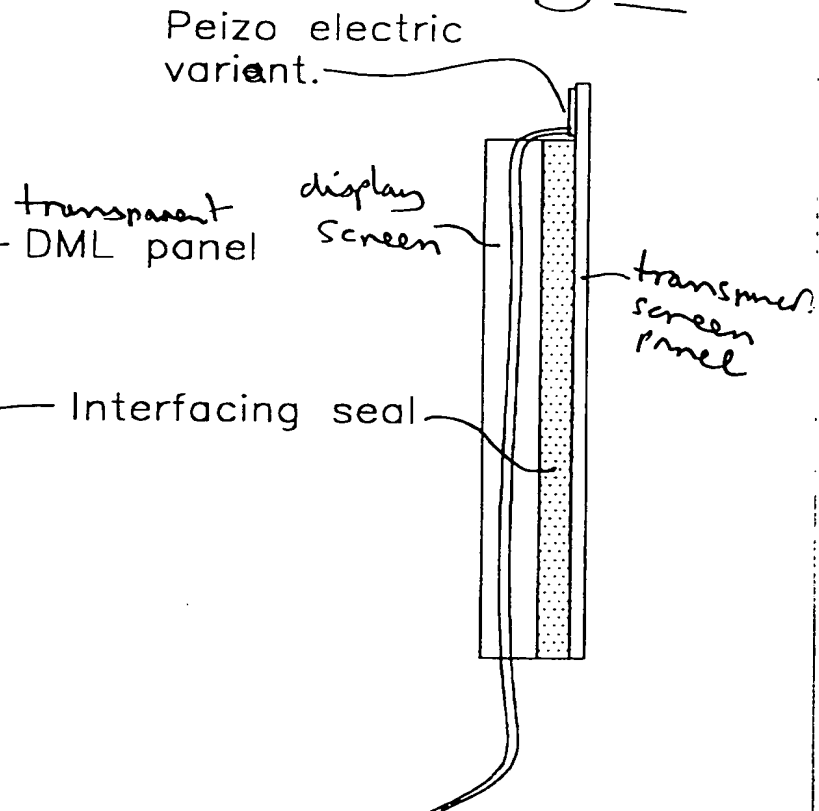


Fig 1

